Electroencephalographic Study on Abdominal Neurosis

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by

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INTRODUCTION

After laparotomies we sometimes encounter the complaints which we cannot easily shake off. These complaints---inflation of the abdomen, which disappears during general or spinal anesthesia, obstipation, unsettled abdominal pain etc.---contain the psychoneurotic factors in the greater part.

According to the denomination of Prof. ARAKI, Kyoto, we call such kind of syndrome "abdominal neurosis".

Most abdominal operations are ineffective and even harmful to this disease. Sympathectomies (thoracic or lumbar) show a temporal improvement, but the symptoms return within one year. The posterior rhizotomy in thoracic spinal segments was done by C. KIMURA and M. MAJIMA and a case could be free fom the symptoms as long as nineteen months. This is a case to which a surgical treatment was performed with the best effect.

C. KIMURA and his co-workers have been studying since 1945 on the etiology and the therapy of this disease, nevertheless the pathogenesis is still obscure, and it is very difficult to find a good surgical treatment.

The etiological obscurity makes us hesitate to regard it a definite disease ; therefore, besides abdominal neurosis other denominations have been used by other authors, for instance abdominal distention or neurogenic constipation, etc. Recently, Prof. M. MAEKAWA, Kyoto, maintains spinal arachnitis as a principal etiological factor, and C. KIMURA demonstrated in laminectomy of his clinical cases the existence of fibrotic change of the spinal arachnoids with wide adhesions. KIMURA considered that the inflammatory change of the arachnoid occurred as a result of careless spinal anesthesia technique. However, he considers other unknown factors in the brain, too, having to do with these diseases. Here, the present author studied electroencepharograms of these patients, because psychoneurotic elements seemed to play an important role in it.

Material and method

The present cases are the out-and in-patients of our clinic, experienced from 1961 to 1963 (table 1). Of twenty-seven cases, thirteen were regarded as abdominal neurosis, nine had intestinal adhesion with inveterate abdominal complaints, and five were hardly differentiated from other abdominal complaints. Almost all of them, except two cases, underwent surgery for their abdominal complaints from one to twelve times. Table 2 shows the surgical treatments they experienced and that appendectomy is the most common trigger of this disease. Table 3 shows that female patients in their twenties occupy the greatest number among them. Table 4 shows their complaints and that six cases had

Table 1 27 cases on which EEG was studied

Case	Name	Sex	Age	First Diagnosis	Diagnosis at Time of Last EEG Test	Chief Complaints	Judgement by EEG Test
1	M.N.	F	30	abdominal neurosis	abdominal neurosis	abdominal pain, nausea, obstipation	abnormal
2	S.S.	F	38	〃	〃	obstipation, headache, anxiety	abnormal
3	C.Y.	F	30	〃	〃	obstipation, abdominal pain, dizziness	border line
4	A.K.	F	20	peritonitis	〃	fever, abdominal pain	abnormal
5	H.H.	M	26	abdominal neurosis	〃	feeling of abdominal inflation, diarrhea	abnormal
6	A.T.	F	43	〃	〃	abdominal inflation, abdominal pain, obstipation	abnormal
7	M.I.	F	23	〃	〃	abdominal inflation	abnormal
8	H.K.	F	9	〃	〃	abdominal pain attack	abnormal
9	M.K.	F	45	〃	〃	abdominal inflation	abnormal
10	T.K.	M	24	〃	〃	abdominal pain	border line
11	Y.T.	F	35	〃	〃	abdominal pain, obstipation	border line
12	K.H.	F	31	〃	〃	abdominal pain, abdominal inflation, diarrhea	border line
13	N.I.	M	28	chronic appendicitis	〃	abdominal pain, dizziness, anxiety	border line
14	C.T.	F	30	abdominal neurosis	intestinal adhesion	abdominal pain, constipation	abnormal
15	U.I.	F	30	singultus	singultus	singultus, general weakness	abnormal
16	H.N.	F	31	intestinal adhesion	gastroenteroptosis	abdominal pain, obstipation, vomiting	normal
17	K.N.	F	14	abdominal neurosis	intestinal adhesion	feeling of abdominal inflation, nausea	normal
18	H.N.	M	21	〃	schizophrenia	general dulness, feeling of esophagus stoppage	border line
19	M.K.	F	34	〃	general weakness	vomiting, diarrhea	normal
20	M.T.	M	28	〃	intestinal adhesion	abdominal pain	border line
21	S.K.	F	21	〃	〃	abdominal inflation, abdominal pain, dizziness	border line
22	C.M.	F	14	〃	〃	abdominal pain, nausea	normal
23	Y.A.	F	28	〃	〃	abdominal pain, abdominal inflation	border line
24	M.S.	F	24	〃	postoperative intestinal stenosis	abdominal pain, fever	border line
25	S.N.	F	24	〃	intestinal adhesion	abdominal inflation, obstipation, anxiety	border line
26	K.A.	F	25	〃	〃	headache, obstipation, insomnia	abnormal
27	H.I.	M	26	〃	〃	abdominal pain, obstipation	border line

The underlined three cases in Table I were diagnosed as abdominal neur- osis, but were later excluded.

Table 2 Surgical operations which the patients experienced until the last EEG's were taken by the author. These patients were considered to have some psychoneurotic factors in their complaints.

	Cases
Appendectomy	19
Partial resection of intestinal canal	14
Elimination of intestinal adhesion	10
Exploratory laparatomy	4
Sympathetic ganglionectomy	4
Operation for ileus	3
Glomectomy	3
Operation to the anus	3
Laminectomy	2
Radical operation to inguinal hernia	2
Vertebral trauma	2
Others	5

Table 3 Age and sex of the cases on which EEGs were taken to analyze the psychoneurotic factors.

Age	Male	Female
~ 10	0	1 (1)
11 ~ 20	0	2 (1)
21 ~ 30	6 (3)	11 (3)
31 ~ 40	0	5 (3)
41 ~ 50	0	2 (2)

( ) : abdominal neurosis

Table 4 Complaints of 27 cases on which EEGs were taken.

	Cases
Abdominal pain	21
Dysmenorrhea (in 21 caces of female)	18
Dull appetite	16
Insomnia	13
Obstipation	12
Vomiting or nausea	11
Feeling of abdominal inflation	10
Abdominal inflation	8
General dullness	7
Headache	7
Diarrhea	6
Dizziness	5
Anxiety	3

a good passage of the intestines. It is worthy of note that two cases present the syndrome of abdominal neurosis after vertebral trauma without any experience of laparotomy, which suggests that arachnitis can possibly be an important factor causing this disease.

None of these patients has the history of convulsive seizure.

Recordings of E. E. G. was made by monopolar leads with eight channels under following conditions :

i. They were kept quietly in spine position, with eyes closed, and recording was continued for 5-20 minutes.

ii. An enforced hyperventilation was ordered for 3-5 minutes, and then recording was made again for 5-20 minutes.

iii. Activation was tried with drugs (usually with 60-90 mg. of diphenhydramine or with 50-100 mg. of Megimide, semetimes with Isomital), and the recording followed for 20-40 minutes.

Drugs were given with slow intravenous injections.

iv. During these examinations the patients were stimulated with the sound of a clap. Mental calculation, opening of the eyes, stoppage of respiration and the like were ordered exercise.

Recordings were repeated before and after a surgical operation, and whenever a change of symptoms was observed.

RESULTS

F. A. GIBBS and E. L. GIBBS claim the positive spikes of 14 and 6 cps as the specific patterns in thalamic and hypothalamic epilepsy, while Y. SHIMODA maintains, besides these, the paroxysmal slow waves as characteristic. The present author studied other abnormal patterns as a sign of psychoneurotic abnormalities contained in these kinds of diseases.

Table 5 and 6 show abnormal EEG found in all twenty-seven cases.

Table 7 shows abnormal patterns found in the cases of abdominal neurosis.

Fig. 1 shows a schema of leading parts.

Table 5 Findings of abnormal EEG (No. 1) and the frequency of their apparance in the 27 cases.

	Arousal	After activation
Slow wave component	19 (2)	—
Spike component (negative or positive)	5 (1)	4 (2)
Sharp wave	8 (1)	10 (1)
Spike and wave complex	0	0 (1)
Paroxymal or extraordinary pattern	6 (1)	11 (2)
Abnormal background activities	8 (3)	8 (3)

( ) : undecided

Table 6 Type and frequency of abnormal EEG (No. 2) that appeared in the 27 cases

	Arousal	After Activation
14 and 6 cps positive spikes	1 (1)	4 (3)
Paroxysmal slow waves with high amplitude	4	8 (2)
Paroxysmal alpha waves with high amplitude	1 (1)	8 (1)
Diffuse and synchronous pattern waves in the same side	3 (1)	2
Dissymmetry	2 (1)	3
Abnormal background activity	8 (3)	8
Diffuse alpha rhythm	4	—
Rare alpha rhytum	2	—

( ) : undecided

Table 7 Findings of abnormal EEG (No. 3) found in 13 cases of abdominal neurosis

	Arousal	After activation
Slow wave components	12	—
Spike components (negative, positive)	4	4
Sharp wave	6	6 (1)
Paroxysmal or extraordinary pattern	1 (1)	5 (2)
Abnormal background activity	4 (2)	5 (3)
14 & 6 cps positive spikes	1	4 (2)
Paroxysmal slow wave of high amplitude	1	4 (1)
Paroxysmal alpha wave of high amplitude	1 (1)	3 (1)
Diffuse, synchronous pattern wave on the same side	2	1
Dissymmetry	1 (1)	2
14 cps spindle in arousal	3	—
Diffuse alpha rhythm	2	0

( ) : undecided

Description of cases :

Case J. H. M., a 26 year-old business man

Clinical diagnosis : Abdominal neurosis

Chief complaints : Feeling of abdominal inflation and diarrhea. Severe abdominal pain occured once a year since 1955.

Laparotomy had been done in 1958 for perforation of duodenal ulcer and the perforated part was closed with omentum plantation. Soon after the operation he was laparotomized again for intestinal stenosis due to adhesion. A tendency to diarrhea developed in the next year. Since May, 1960, he has been suffering from a feeling of abdominal inflation, diarrhea and bad appetite. However, he was never aware of these symptoms while he was busy in his businesswork, whereasthey became more severe when he was engaging in muscular exercise or when he was reading books.

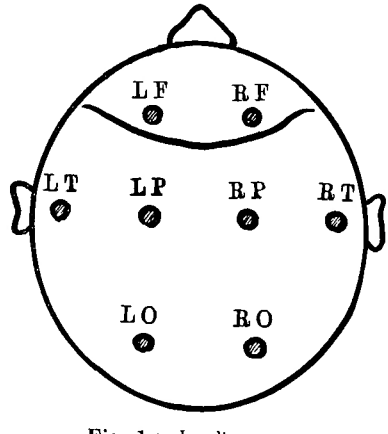

Fig. 1 : Leading parts

On admission, he was free from abdominal inflation, and x-ray examination presented

no intestinal obstruction.

He recovered from these complaints after the internal treatment with thymoleptica.

EEG findings in rest and arousal : 11-14 cps spindles, diffuse and synchronous patterns of the same side were observed.

In hyperventilation : Spiky waves appeared besides the above patterns.

With the intravenous injection of 60 mg. Diph., there appeared paroxysmal alpha waves of high amplitude and slow components, and diffuse and synchronous waves of the same side increased. After twenty minutes, 6 cps positive spikes appeared only on the right side. (Fig. 1-a to 1-i)

Case Ⅱ. S. S., a 38 year-old woman ; worker

Clinical diagnosis : Abdominal neurosis

Chief complaint : Feeling of abdominal inflation and constipation

Appendectomy was performed ten years ago. Right abdominal pain occurred since

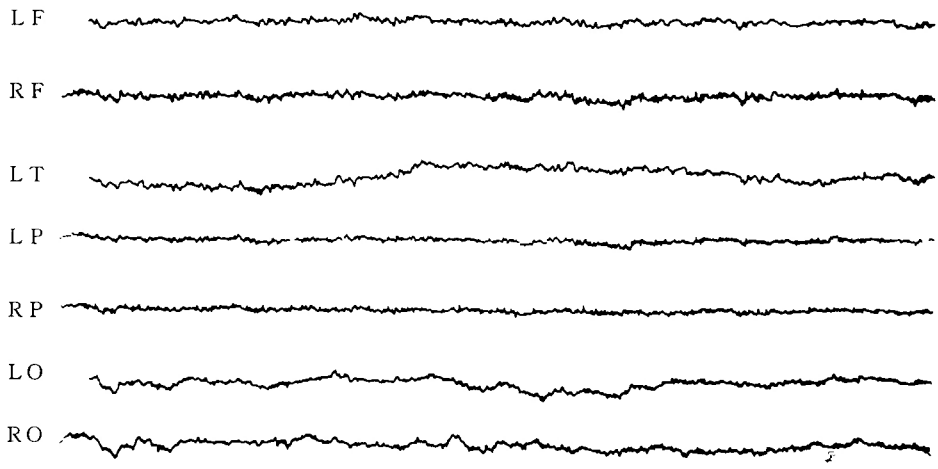

Fig. 1-a : Arousal ; 14cps spindle and spiky waves

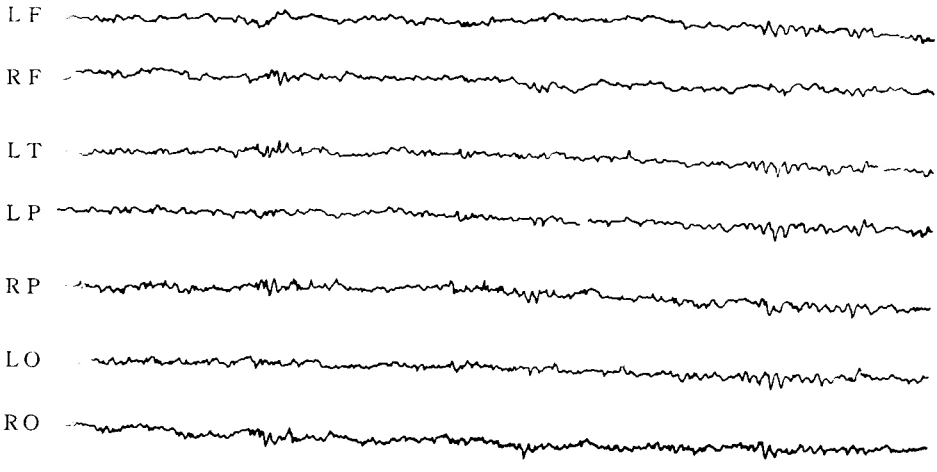

Fig. 1-b : After enforced hyperventilation ; Synchronous pattern of the same side.

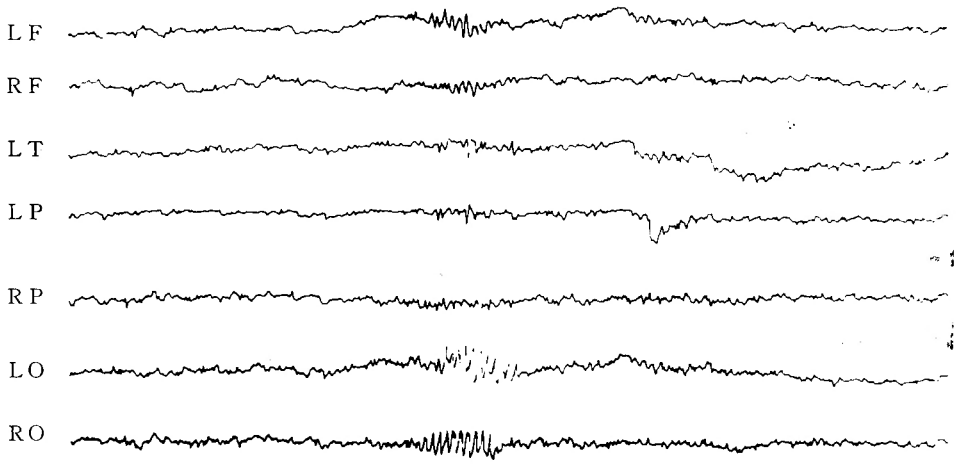

Fig. 1-c : 4 min. after Diph. 60 mg. (abbreviation of Diphenhenhydramine) injected ; paroxysmal alpha wave of high amplitude

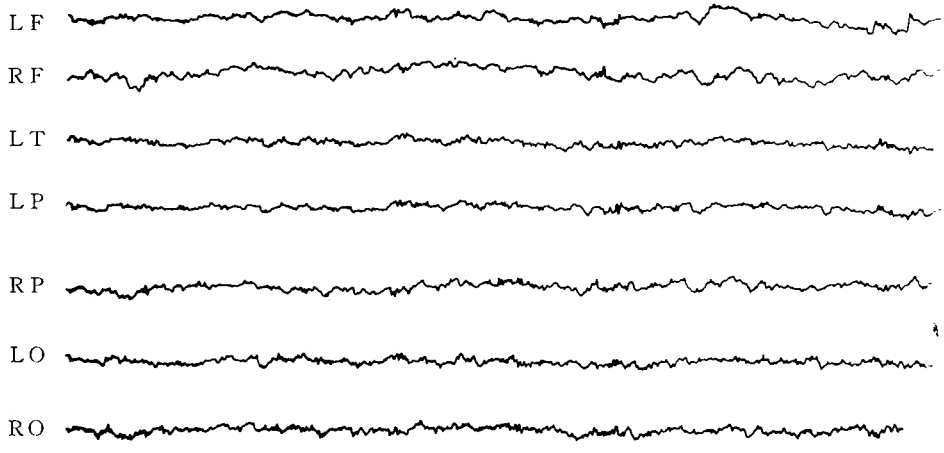

Fig. 1-d : 10 min. after Diph. 60mg. injected : slow wave component

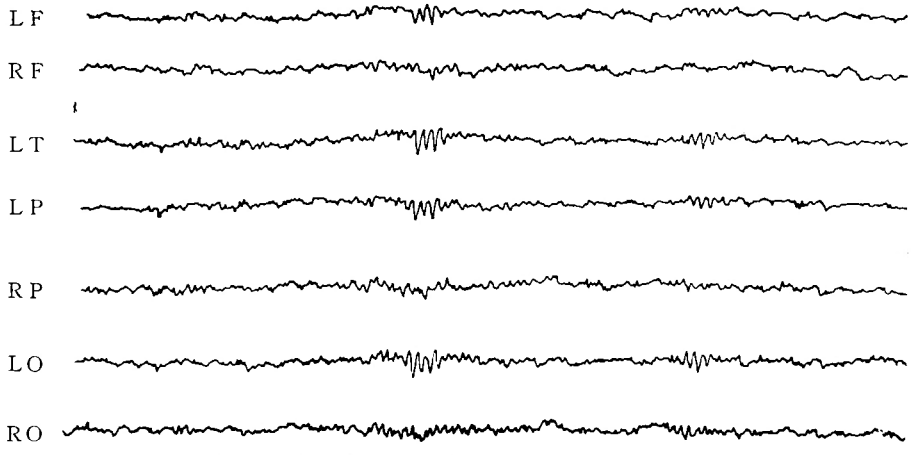

Fig. 1-e : 16 min. after Diph. 60mg. injected ; synchronus pattern of the same side

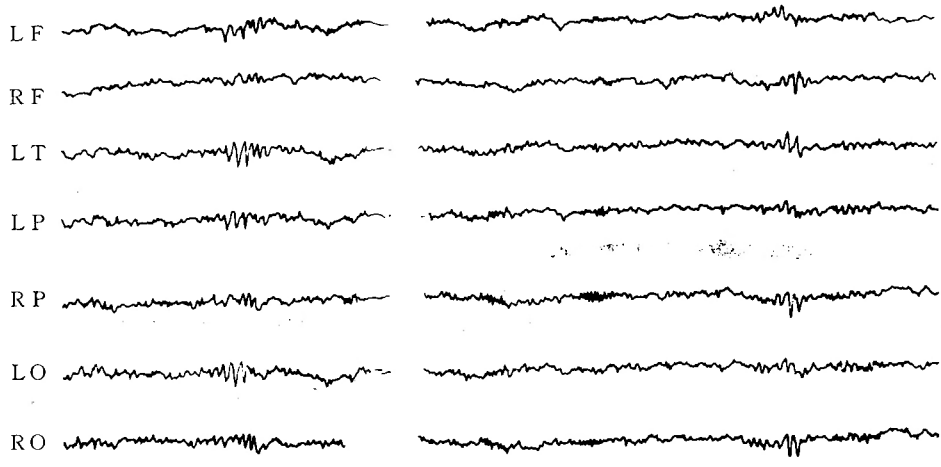

Fig. 1-f : 18 min. after Diph. 60mg. injected ; synchronus pattern of same side

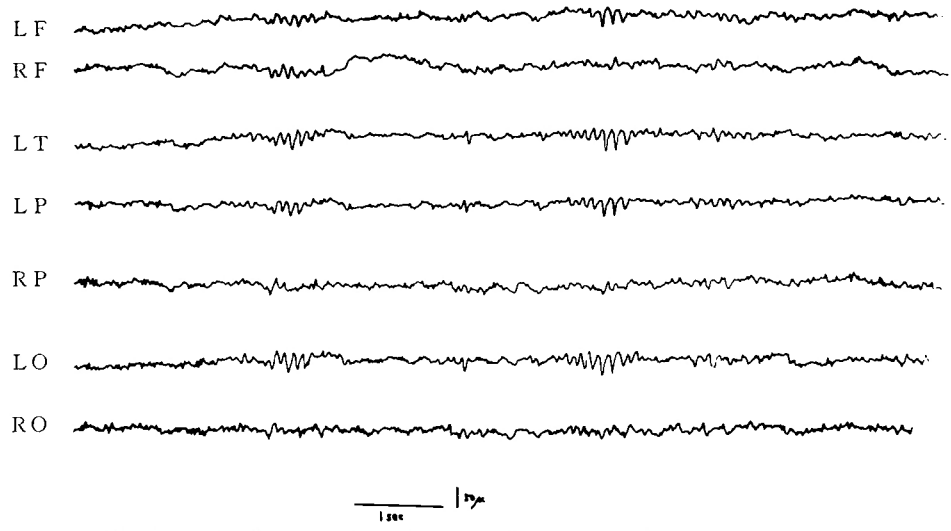

Fig. 1-g : 19 min. after Diph. 60mg. injected ; synchronous pattern of same side

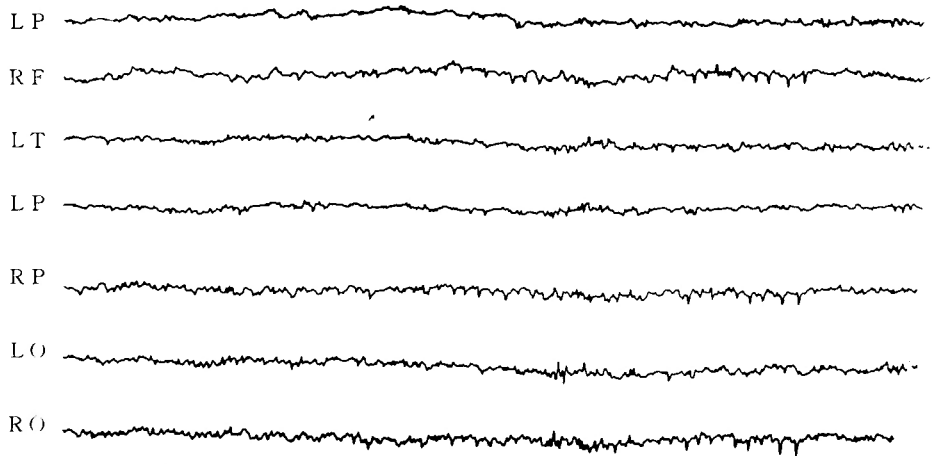

Fig. 1-h : 20 min. after Diph. 60 mg. injected ; 6 cps positive spikes at right side

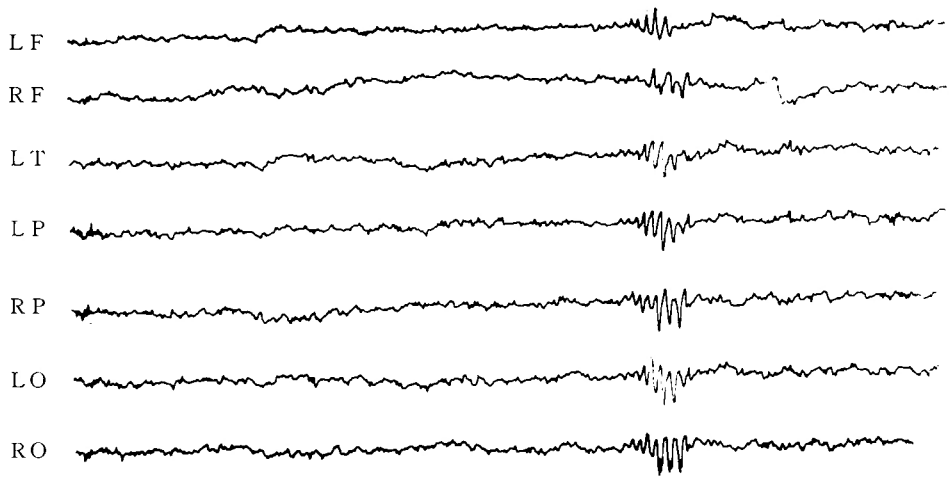

Fig. 1-i : 21 min. after Diph. 60 mg. injected ; Paroxysmal alpha wave of high amplitude

three years ago. Under the diagnosis of intestinal adhesion laparotomies were performed four times without any effect.

On admission, she felt tenderness in the hypogastric region and in the left flank. In spite of her complaint, no abdominal inflation was observed. In the pharmacodynamic examination of the automomic nerve tone, adrenaline test was positive. Catecholamin in urine showed an increase (Ad-15.4 r/24h, NAd -33.6 r/24h).

A slight obstruction of the intestine was found in the x-ray examination.

She got better usually when she went outdoors and got worse with a slight fever when she was dissatisfied or when she was in gloomy weather.

The sudden attacks---headache, dizziness, abdominal pain, feeling of abdominal inflation, etc.---attacked her when she was in some personal troubles at home or at work, whereas the spells never occurred when she was absorbed in her jobs. She had a very fragile character. When she was driving in a car she was obsessed by anxiety of having a traffic accident.

Though the objective symptoms were not improved, Tofranil (a thymoleptica) was effective to stabilize her mental condition.

She is now engaging in her work.

EEG in arousal : Diffuse alpha waves are shown. In enforced hyperventilation: The amplitude of alpha waves became minimum and slow components predominated.

After the intravenous injection of 60 mg. of Diph., 6 or 14 cps positive spikes appeared. The amplitude of them was greater on the parietal and occipital regions. In general many spiky wave bursts began to appear. (Fig. 2-a, 2-b, 2-c, 2-d, 2-e, 2-f)

Case Ⅲ. A. T., a 43 year-old woman without a regular occupation

Clinical diagnosis : Abdominal neurosis

Chief complaint : Abdominal inflation, constipation and abdominal pain

Three years ago, a traffic accident caused her head injury and spinal fracture.

Since then, she suffered from abdominal inflation, obstipation with the loss of inclination for stool, left hypogastric pain and head ache. Obstipation continued for one month

unless a laxative or clyster was used.

Medical examinations after the accident proved a slight hypesthesia in the whole body, urinary incontinence and severe obstipation, which suggested a lesion in the brain and spinal cord.

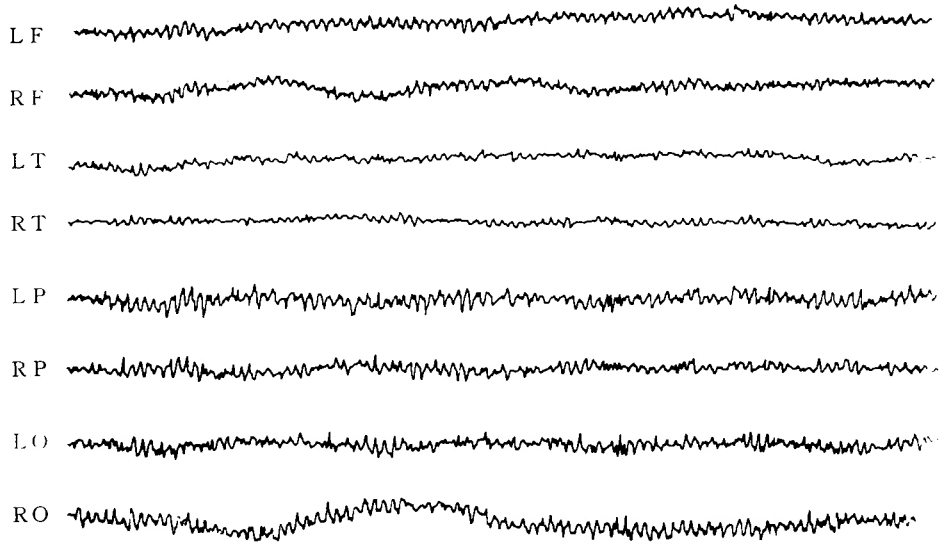

Fig. 2-a : Arousal ; Diffuse alpha

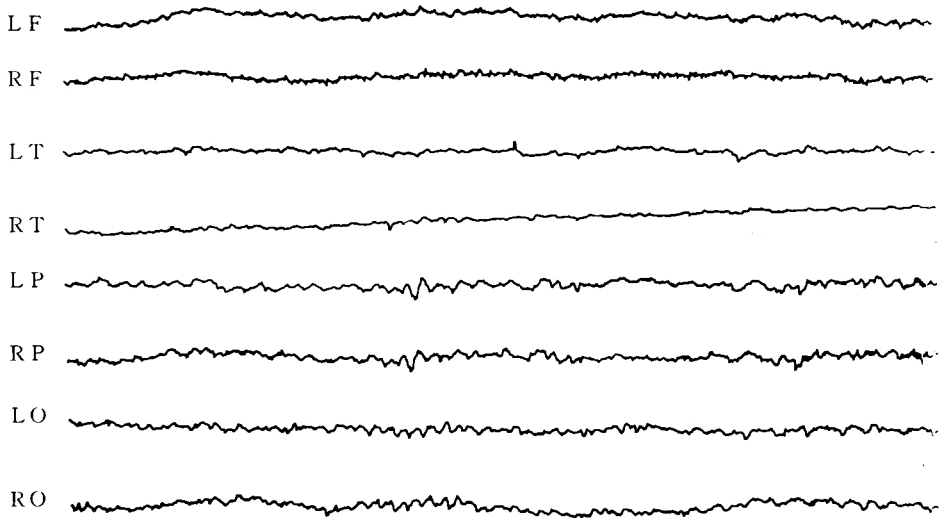

Fig. 2-b : Enforced hyperventilation ; slow wave components prominent

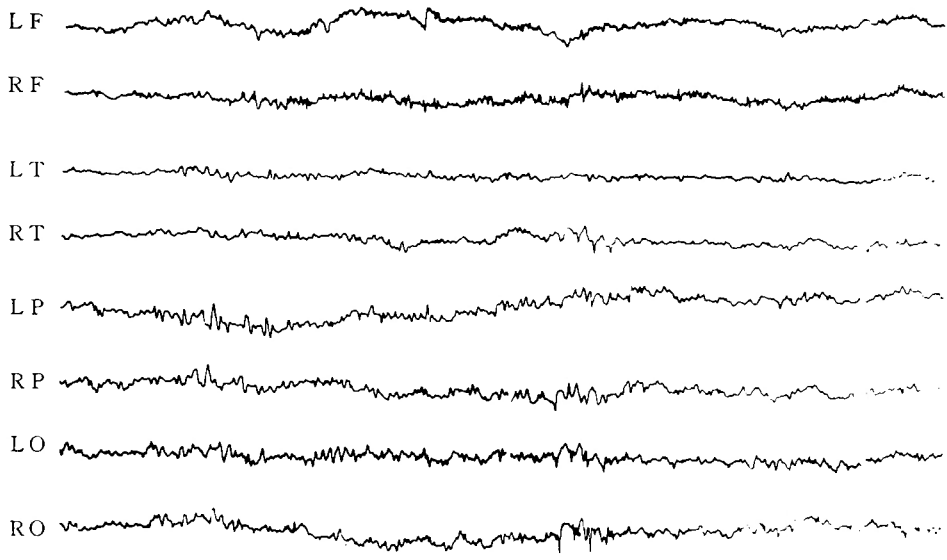

Fig. 2-c : After Diph. 60 mg. injected ; positive spiky wave

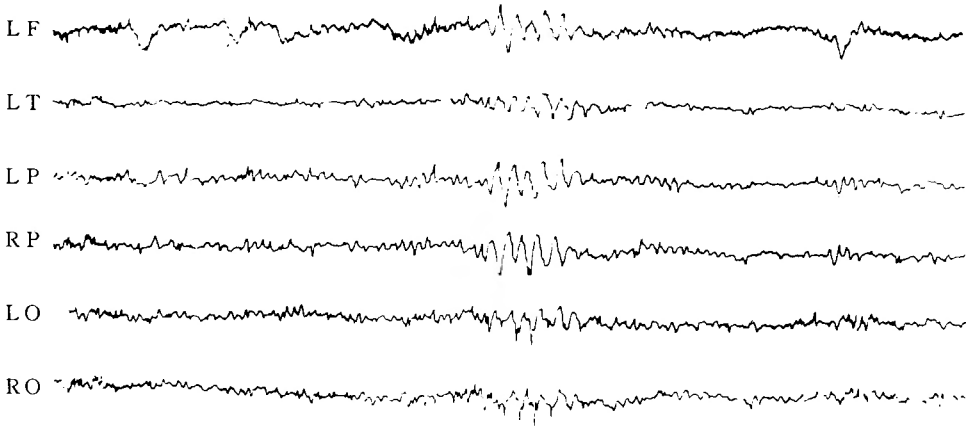

Fig. 2-d : 15 min. after Diph. 60 mg. injected ; Paroxysmal slow wave discharges with 6 cps positive spikes

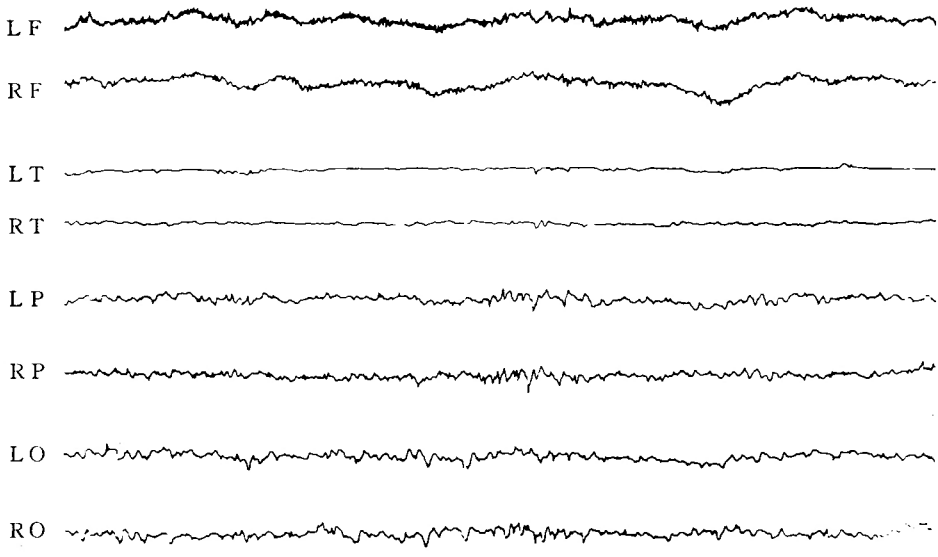

Fig. 2-e : 20 min. after Diph. 60 mg. injected ; paroxysmal positive spiky wave

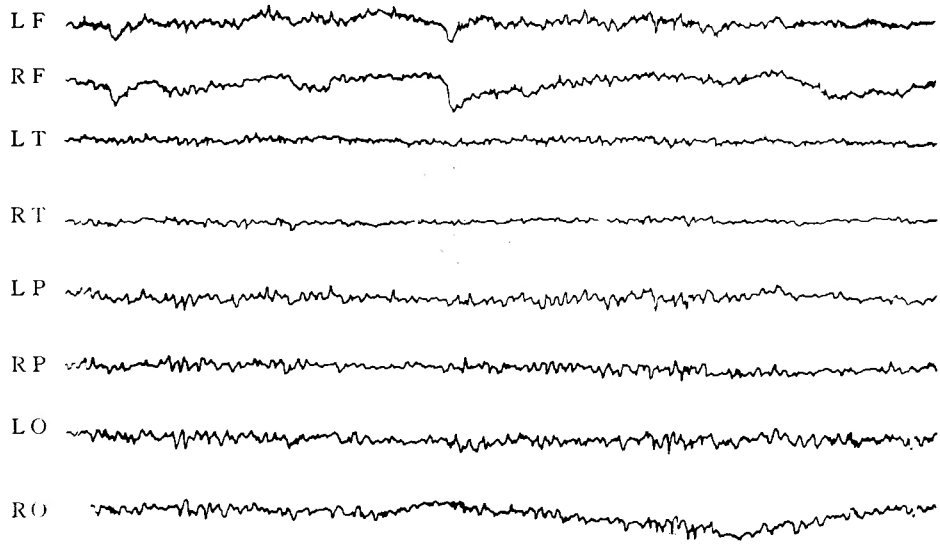

Fig. 2-f : 15. min after Diph. 90 mg. injected ; 14 cps positive spikes

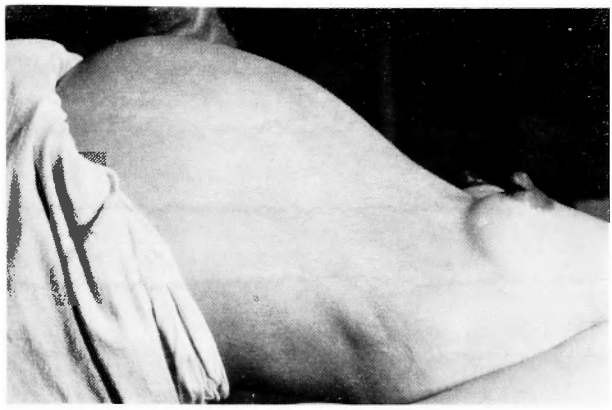

Fig. 3-a : Photo. ; Intense abdominal inflation.

Abdominal inflation was intense (3-a), and it did not change after defecation, but it suddenly disappeared under general anesthesia. X-ray examination presented the dilatation of the whole intestines. Slight intellectual debility with abnormal character was observed. She was far from smiling and repeated the same complaints whenever we visited her. Abdominal distention disturbed her from lying in bed, so she was standing all day long by her bed and would not talk with other patients.

Part of her complaint seemed to be fabricated and delusive, but it was certain that traumatic arachnitis took a part in her neurotic complaints.

For relieving constipation, the presacral sympathectomy was performed and abdominal inflation and pain disappeared, but constipation is still continuing, though markedly improved.

EEG showed much more stabilized patterns when she left the hospital than when she was admitted. This suggests to us that peripheral continuous stimulus can have influence upon EEG. (Fig. 3-b, 3-c, 3-d, 3-e, 3-f, 3-g, 3-h, 3-i)

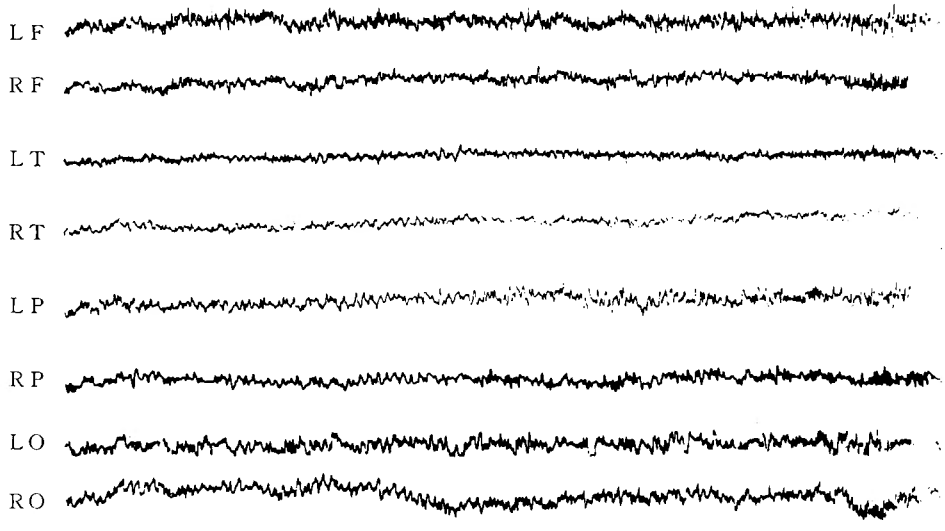

Fig. 3-b : Arousal, at rest ; Abnormal background activity (before operation)

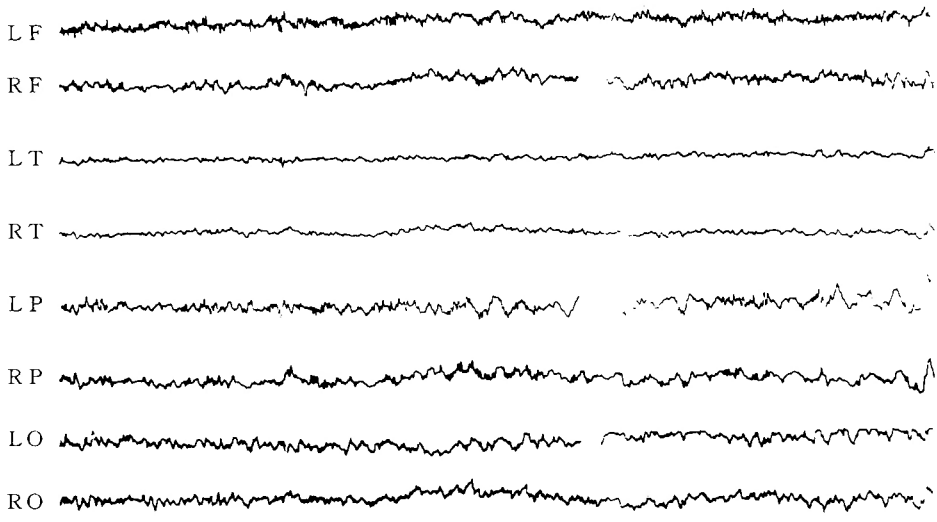

Fig. 3-c : Arousal ; Sudden appearance of slow wave (before operation)

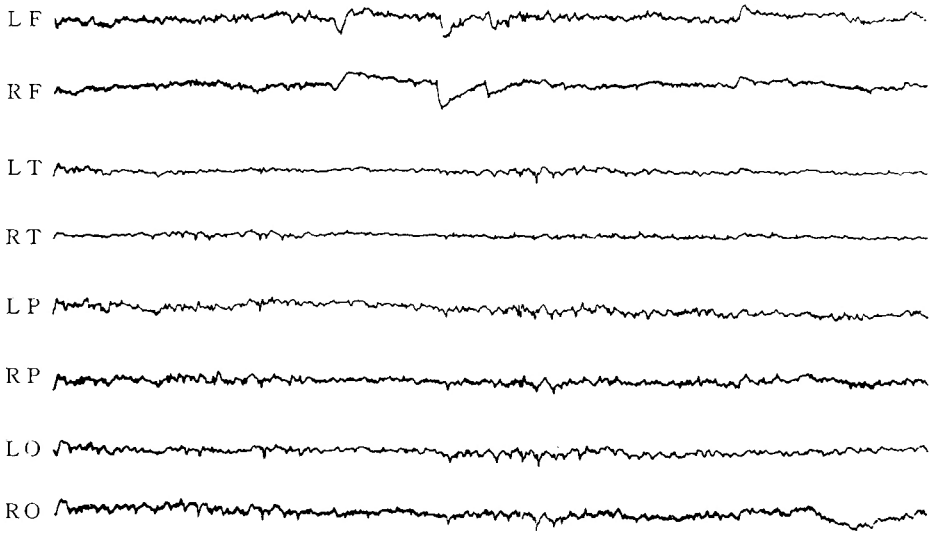

Fig. 3-d : 10 mg. after Diph. 60 mg. injected (before operation)

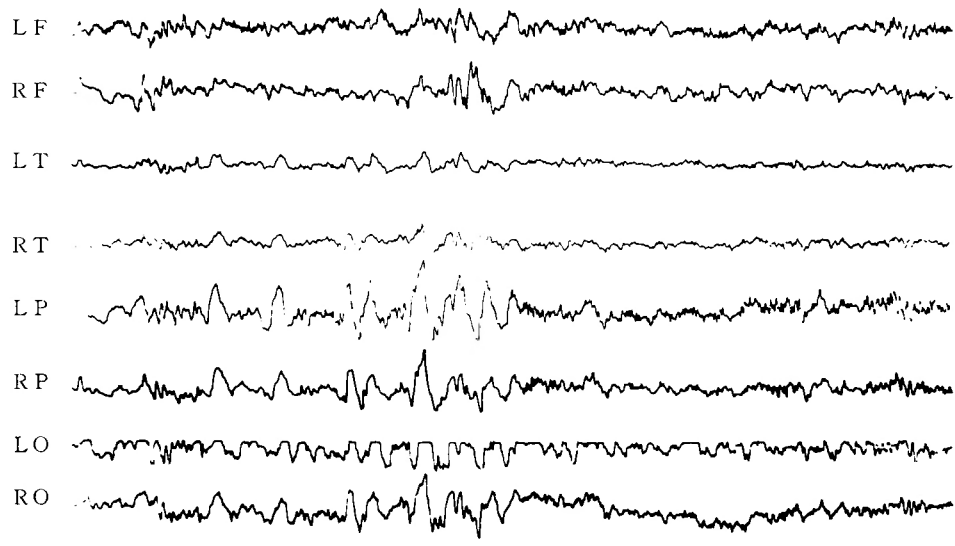

Fig. 3-e : 21 min. after Diph. 60 mg. injected (before operation)

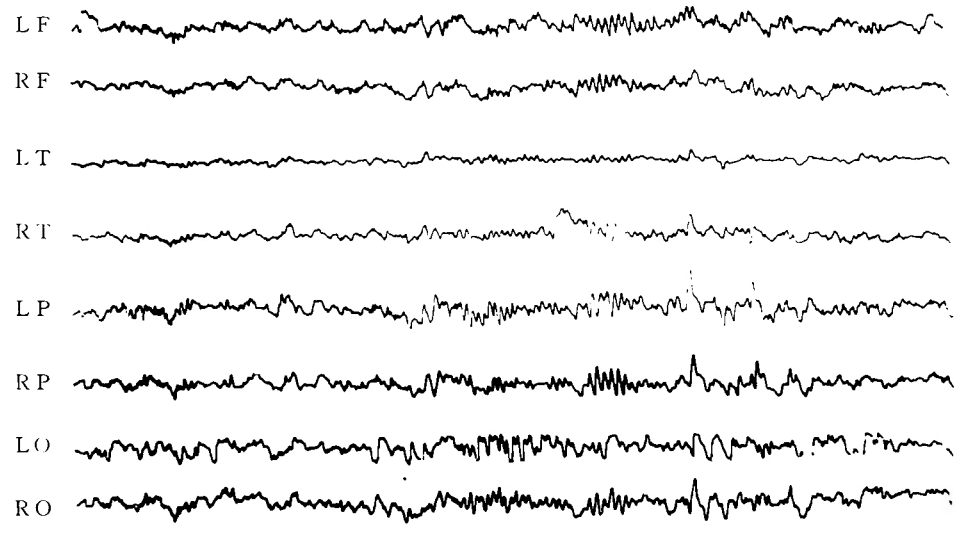

Fig. 3-f : 22 min. after Diph. 60 mg. injected ; appearance of 14 cps spindle (before operation)

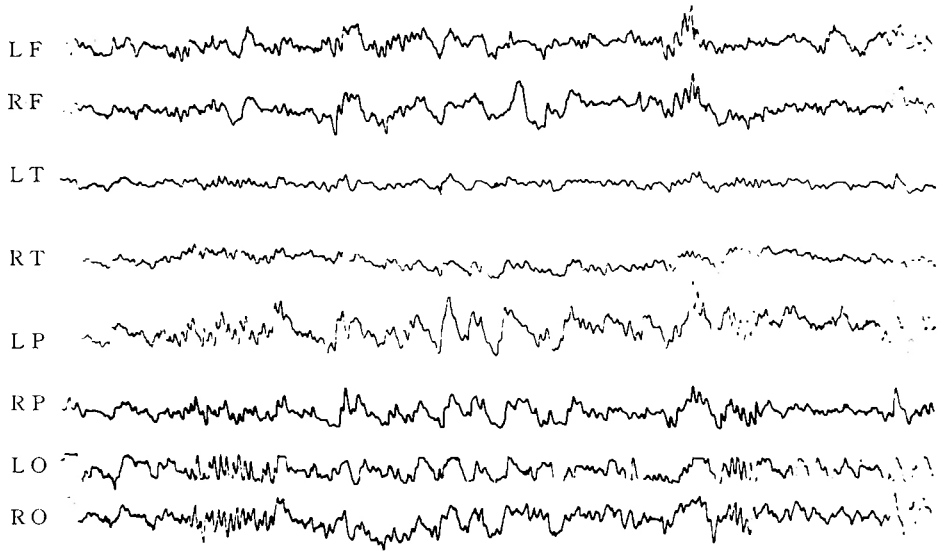

Fig. 3-g : 26 min. after Diph. 60 mg. injected ; mostly 14 cps spindle and slow wave (before operation)

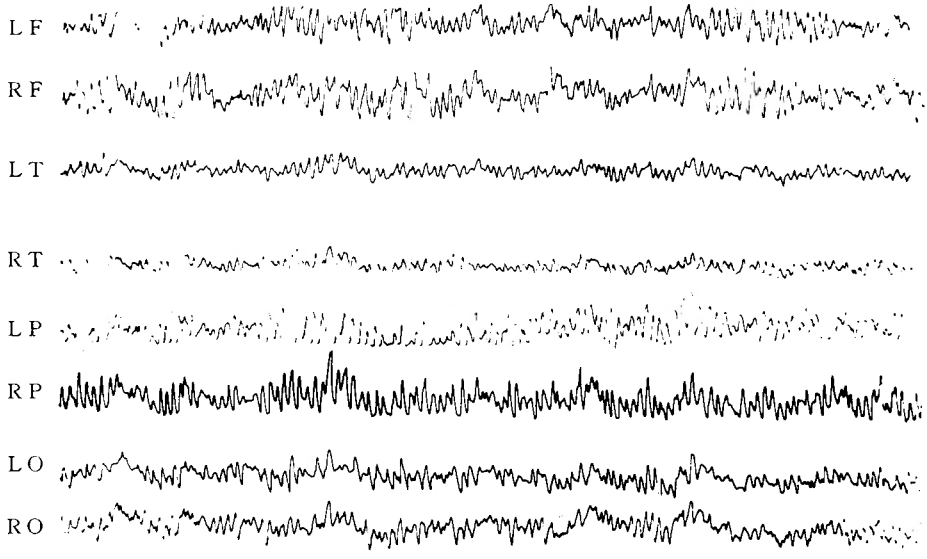

Fig. 3-h : Deep sleep stage after Isomital injection ; mostly 14 cps spindle or rhythm (before operation)

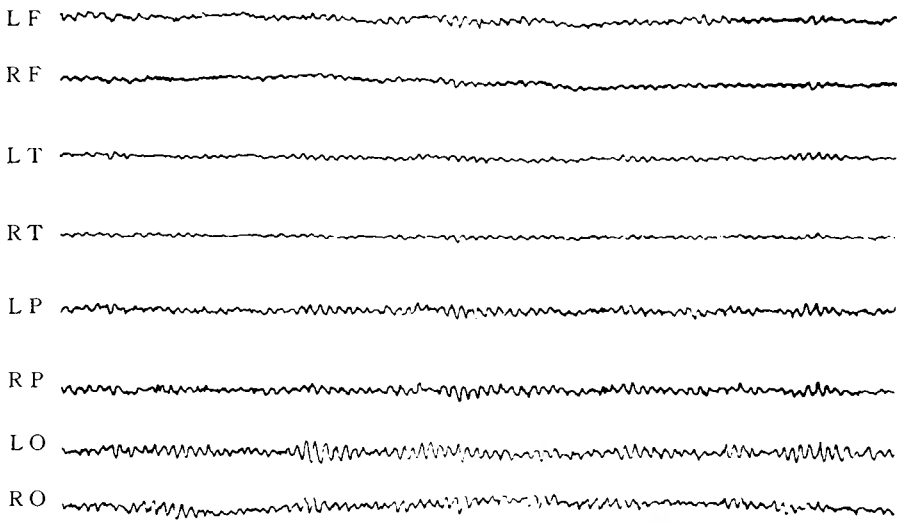

Fig. 3-i . Arousal ; After operation (cf. 3-b).

Before operation, EEG in arousal consisted mainly of irregular fast waves, and they altered suddenly to irregular slow waves.

After the intravenous injections of 60 mg. of Diph., the amplitude of slow waves decreased, 6 cps positive spikes appeared, and slow waves with high amplitudes and 14 cps spindles became predominant.

The recording under the general anesthesia with isomital showed only a continuance of 14 cps spindles.

After operation, EEG during arousal became stable and showed 10 cps diffuse alpha pattern mostly (3-i).

Case 4. M. I., a 23-year-old business girl

Clinical diagnosis : Abdominal neurosis

Chief complaint : Abdominal inflation

Appendectomy was performed three years ago, and soon after laminectomy was done

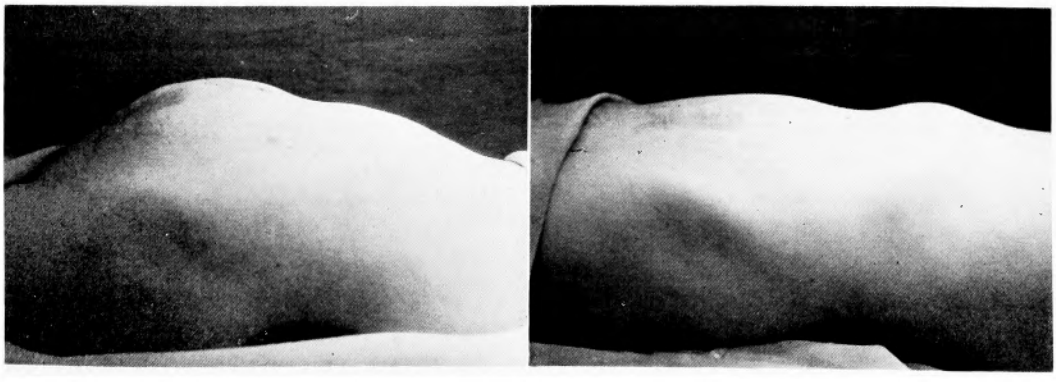

Fig. 4-a : Photo ; intense abdominal inflation in a case of abdominal neurosis

Fig. 4-b : Photo. ; After lumbar anesthesia.

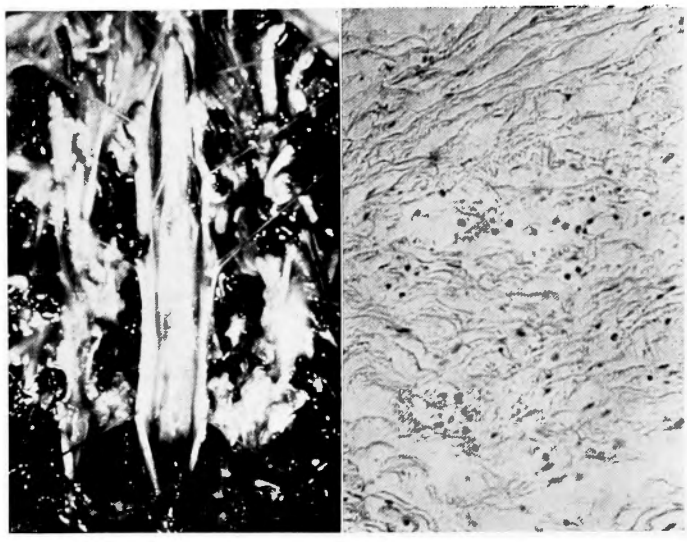

Fig. 4-c and 4-d : Photo ; Pictures of chronic arachnitis found in an abdominal neurosis ; left ; macroscopic ; right : microscopic

for disc hernia. Right hemicolectomy were done to relieve abdominal pain under the diagnosis of cecum mobile. Since these surgical operations, she suffered from progressive abdominal inflation and pain. Inflation was intense and continuous (Fig. 4-a, 4-b). She had defecation once a day, but she felt gas remained in the bowels. Tenderness was felt near the operation scar in the right abdomen. General weakness and lumbar pain were complained about too. Mood was serene and general state did not seem to be too bad.

Laminectomy was performed in the thoracic segments. There was arachnoidal adhesion with venous congestion. The adhesion was too hard to detach, so the iodine oil

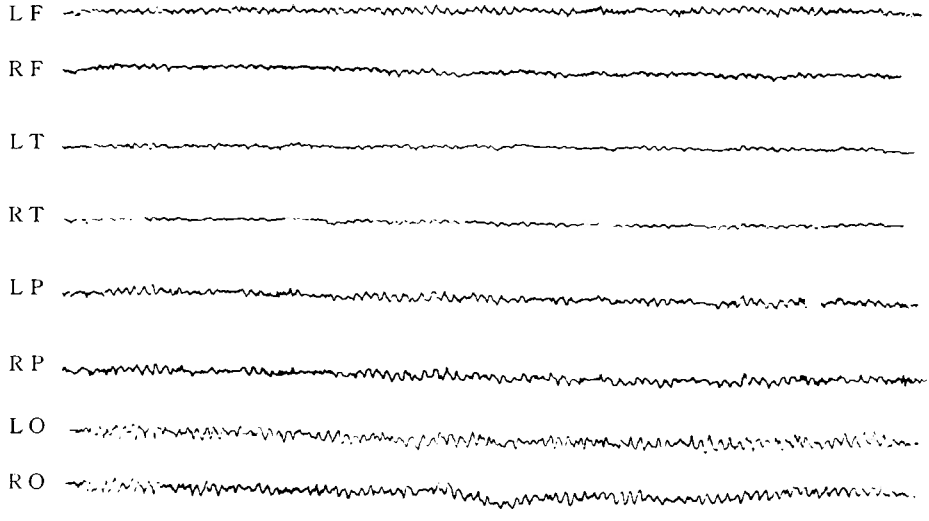

Fig. 4-e : Arousal, at rest ; Diffuse alpha.

mass remained in the spinal fluid after former myelography was drained, and adhesions were left untouched. (Fig. 4-c, 4-d) Thereafter she was free from abdominal inflation for a year and a half, that is, until recurrence.

EEG : Diffuse alpha patterns appeared in rest and avouse paroxysmal slow waves in enforced hyperventilations.

By the intravenous injection of 60 mg. Diph., paroxysmal slow waves rather decreased, and there appeared the bursts of high amplitude alpha waves and sporadic spikey waves. Activation with 100 mg. of megimide caused the appearance of 8 - 9 cps diffuse alpha waves mainly, and sometimes continuous paroxysmal alpha waves of high amplitude. (Fig. 4-e, 4-f, 4-g, 4-h, 4-i, 4-j)

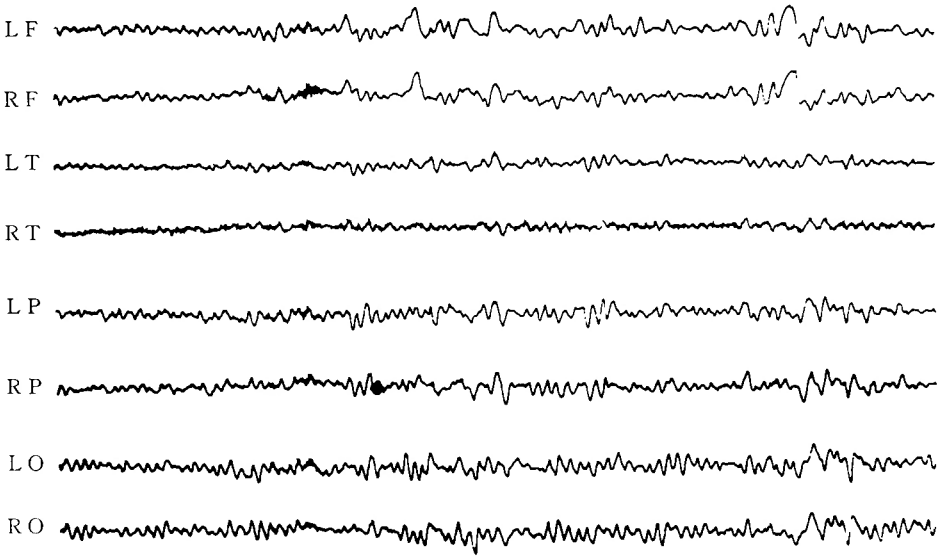

Fig. 4-f : Enforced hyperventilation ; Appearance of paroxysmal slow wave

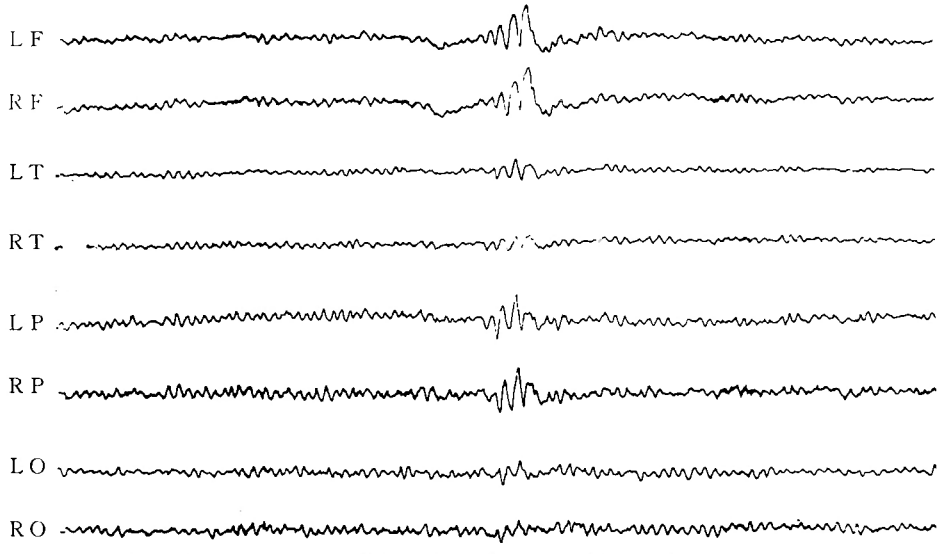

Fig. 4-g : 19 min. after Diph. 60 mg. injeced ; diffuse alpha and paroxysm

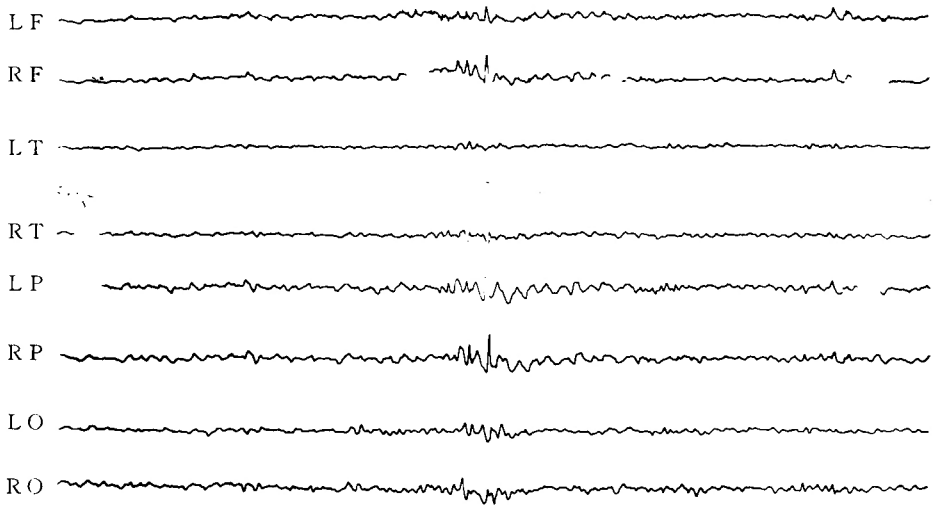

Fig. 4-h : After Diph. injected ; Appearance of spikes

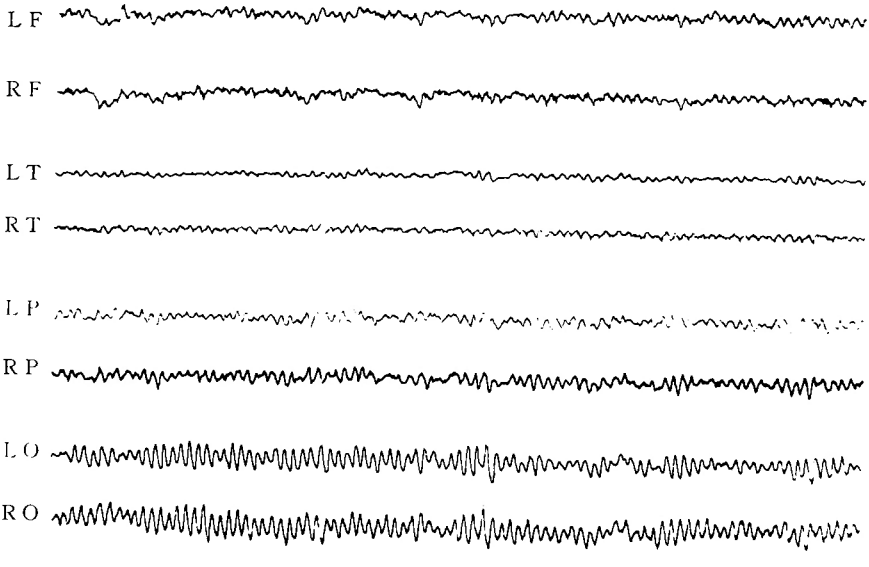

Fig. 4-i : After Meginide 100 mg. injected ; diffuse alpha

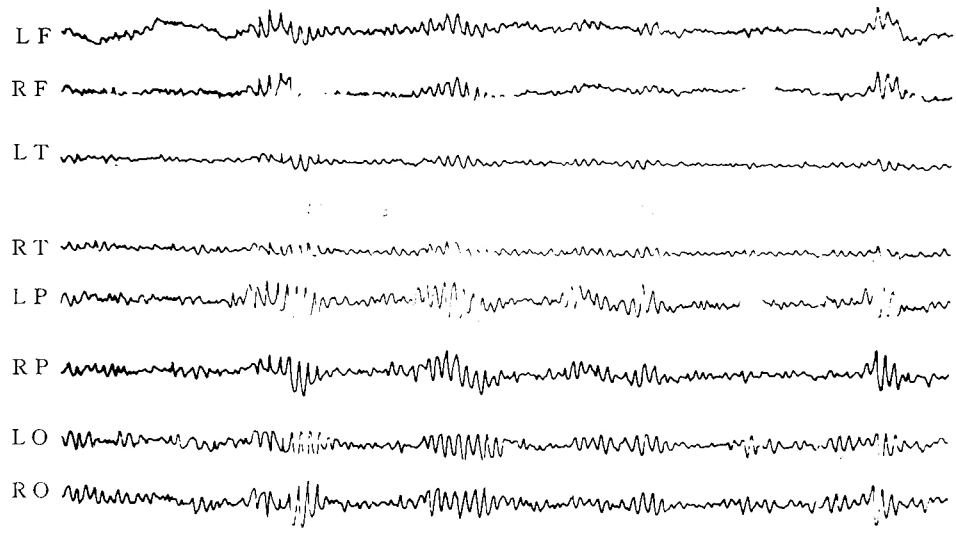

Fig. 4-j : After Megimide 100 mg. injected ; Paroxysmal alpha wave of high amplitude

Case 5. F. K., a nine-year-old school girl

Clinical diagnosis : Abdominal neurosis

Chief complaint : Abdominal pain attack

Premature birth in eighth month. Convulsive fits occurred from three months to five years of age.

Abdominal pain attacked her at the age of seven since she was sent out to live with her grandmother. Pain always began in the left hypochondrium and spread downwards. The fits occurred usually once in one or two weeks and continued for 10-15 minutes. The pain attacks were unrelated to meals nor followed by vomiting. There was no accompanying fever.

Comforting words to her lessened the complaints.

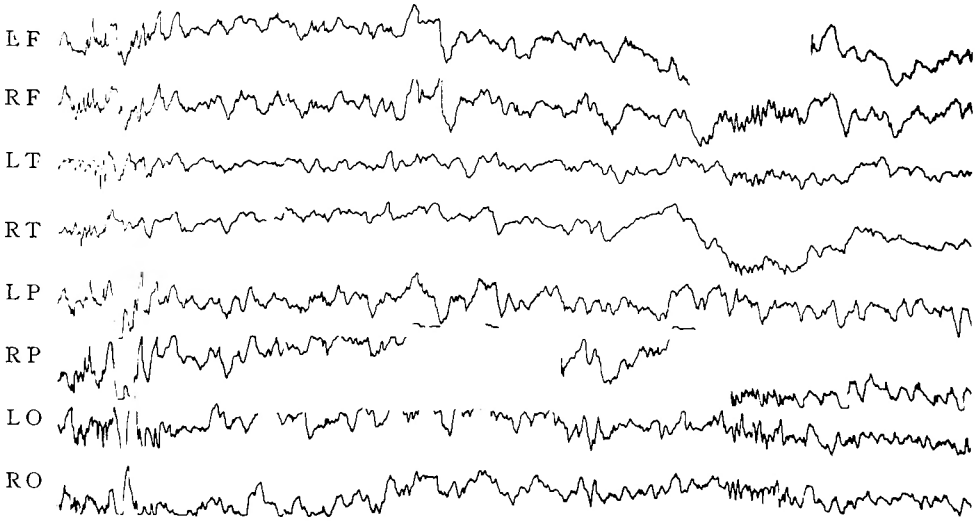

Fig. 5-a : light sleep ; 14 cps positive spikes ; phases diverse

With the help of x-ray examination tenderness was detected in the duodenal bulb, and hypermobility of the cecum was demonstrated. She left the hospital during the course of internal treatment, which seemed to be fruitless.

EEG : In rest and arousal : About 10 cps alpha waves predominated, and slow wave components were contained in them.

Natural sleep caused the appearance of 14 and 6 cps positive spikes. Concerning 14 cps positive spikes, as seen in Fig. 5, they were synchronous in all leads in most cases, and the phase on one side inversed sometime to 14 cps negative spikes. Irregularly mixed positive and negative waves were observed. (Fig. 5-a, 5-b, 5-c, 5-d, 5-e)

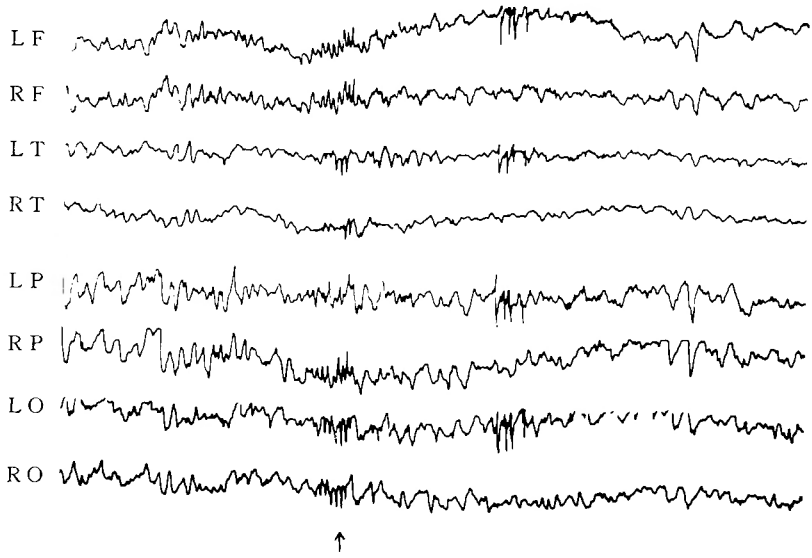

Fig. 5-b : light sleep ; 14 cps positive spikes ; phases diverse

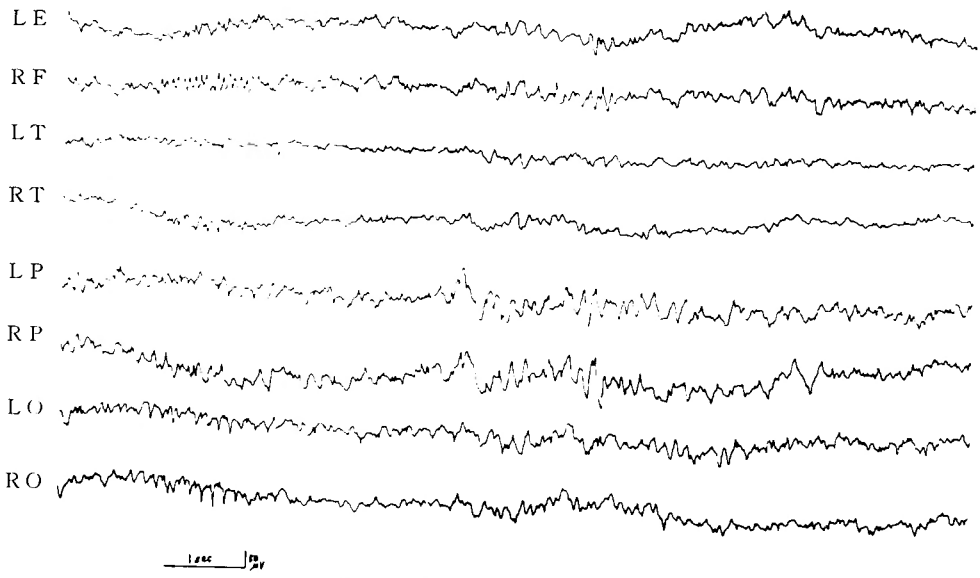

Fig. 5-c : Light sleep ; 6 cps positive spikes.

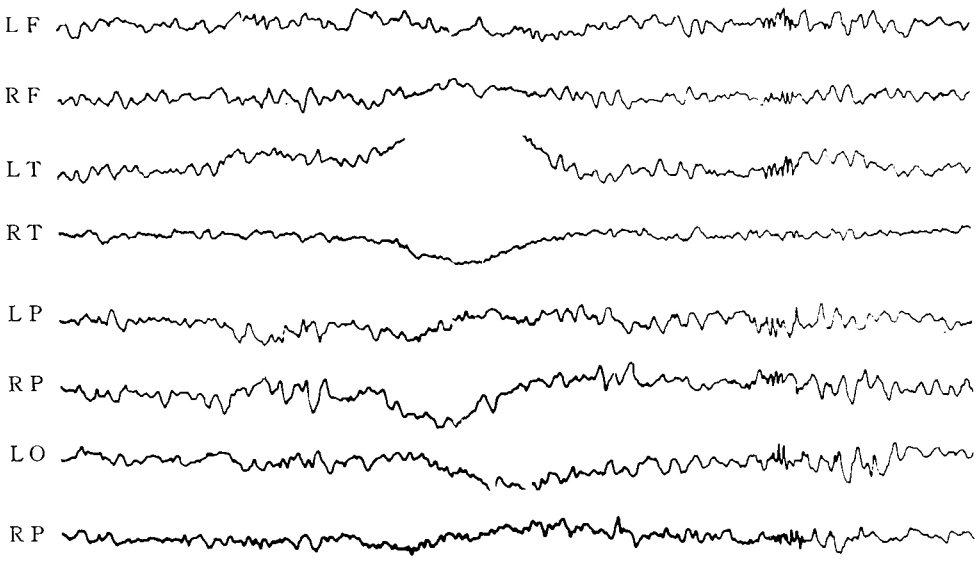

Fig. 5-d : 14 cps postive spikes ; phases diverse

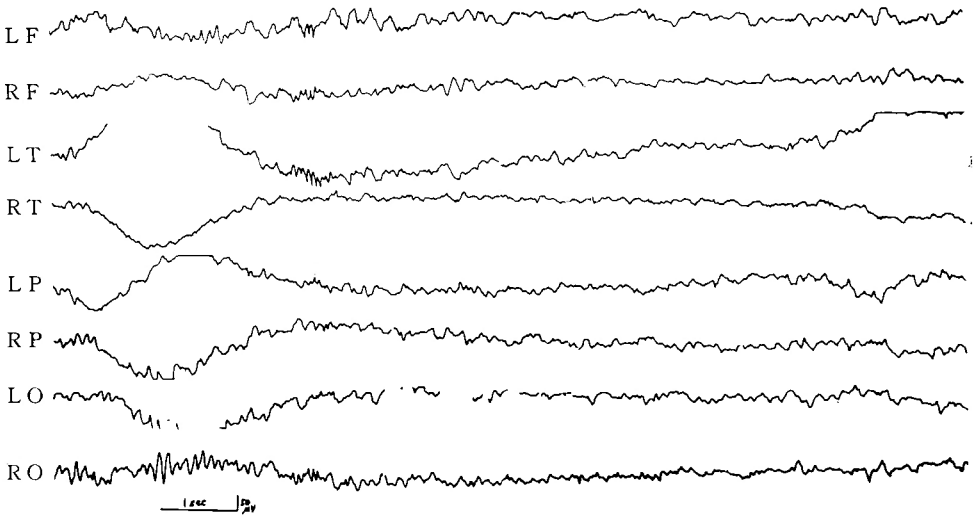

Fig. 5-e : 14 cps positive spikes ; phases diverse

Case 6. M. T., a 28-year-old man without a regular occupation

Clinical diagnosis : Intestinal adhesion

Chief complaint : Abdominal colicky pain

He had an appendectomy two years ago. Laparotomized again for intense abdominal pain with vomiting last year, but no organic change was discovered. He suffered from the same attack 6 times since then and underwent gastrectomy for ulcer. The result of operation was fruitful, but abdominal pain returned with poor appetite, obstipation, insomnia

and slight abdominal inflation since three months ago.

On admission, the symptomes reminded us of abdominal neurosis, but loosening of wide adhesion of the great net to the abdominal walls brought a complete recovery.

EEG : In rest and arousal, an irregular and labile background activity containing slow components is shown in Fig. 6.

After the intravenous injection, of 60 mg. of Diph., a low voltage record predominant in slow waves with low amplitude and slow waves were observed. (Fig. 6-a, 6-b, 6-c, 6-d)

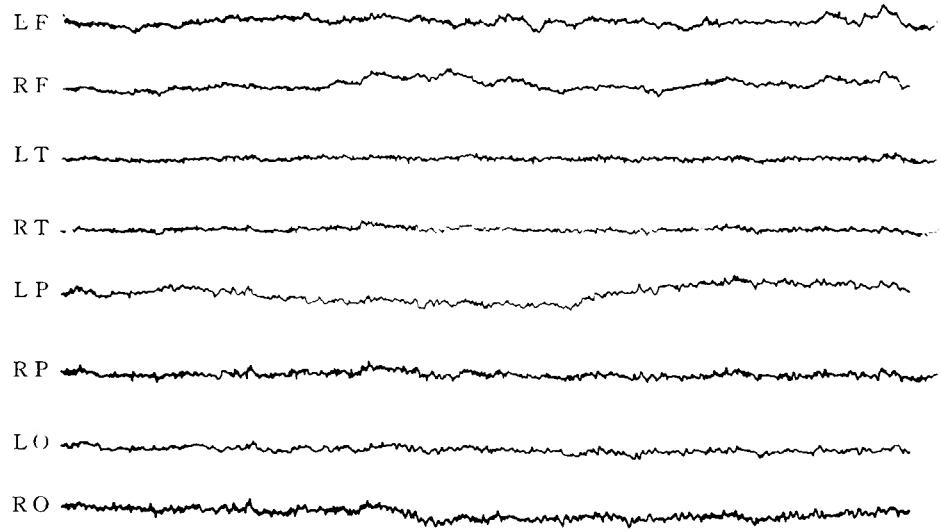

Fig. 6-a : arousal ; at rest ; unstable background activity ; low voltage and slow component

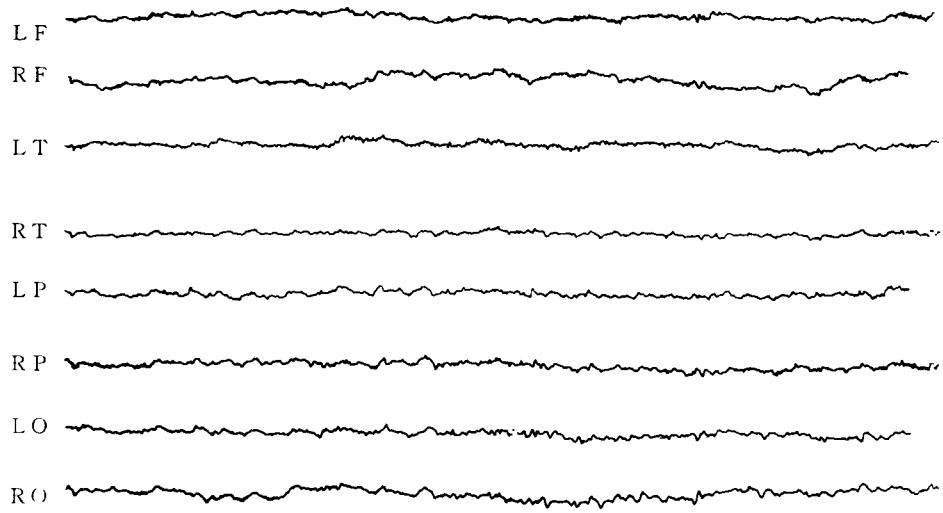

Fig. 6-b : after Diph. 60 mg. injected ; low voltage and slow wave with low amplitude prominent

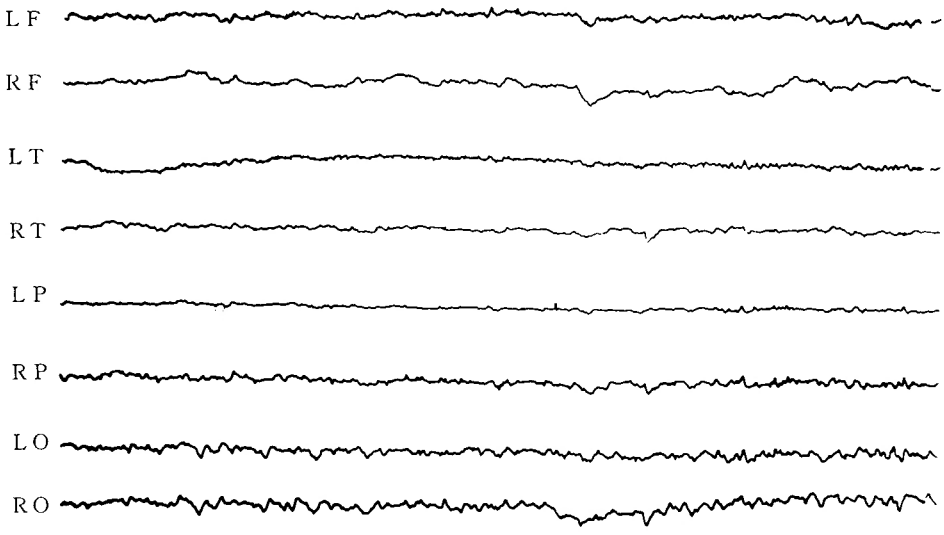

Fig. 6-c : after Diph. 60 mg. injected ; low voltage and slow component

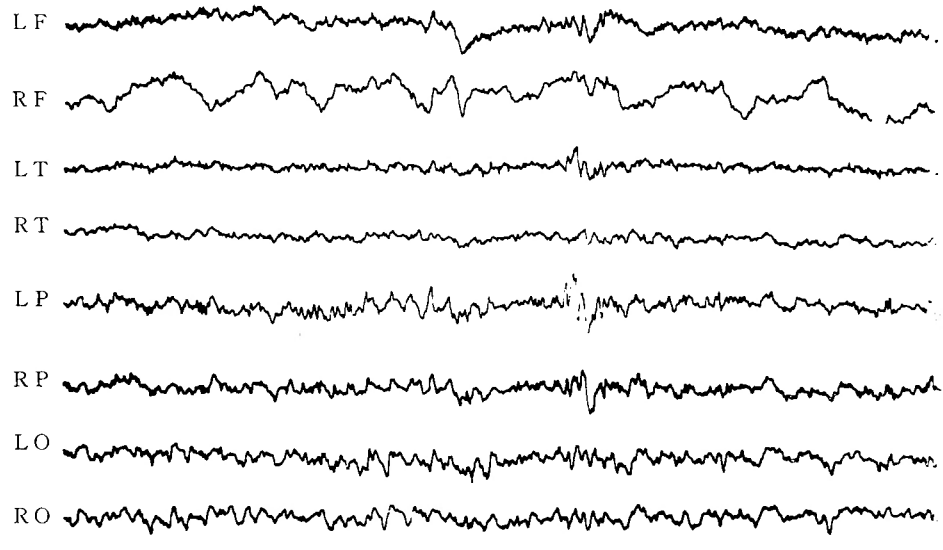

Fig. 6-d : after Diph. 60 mg injected ; gain doubled

Case 7. K. A., a 25-year-old woman without occupation

Clinical diagnosis : Intestinal adhesion

Chief complaint : Headache, general fatigue, poor appetite, vomiting and constipation.

Cecoplasty was performed four years ago, right hemicolectomy three years ago, and laparotomy for intestinal obstruction last year. No medicine was useful for diagnosis. She is now under internal treatment as an out-patient.

EEG : In rest and arousal, EEG show the recordings with slow wave components, labile background activity and predominance of alpha waves. In enforced hyperventilation, there appeared multiple paroxysmal slow wave bursts markedly.

After the intravenous injection of 60 mg. of Diph., slow components predominated in background activity and paroxysmal slow wave bursts with lower amplitudes appeared frequently. (Fig. 7-a, 7-b, 7-c, 7-d)

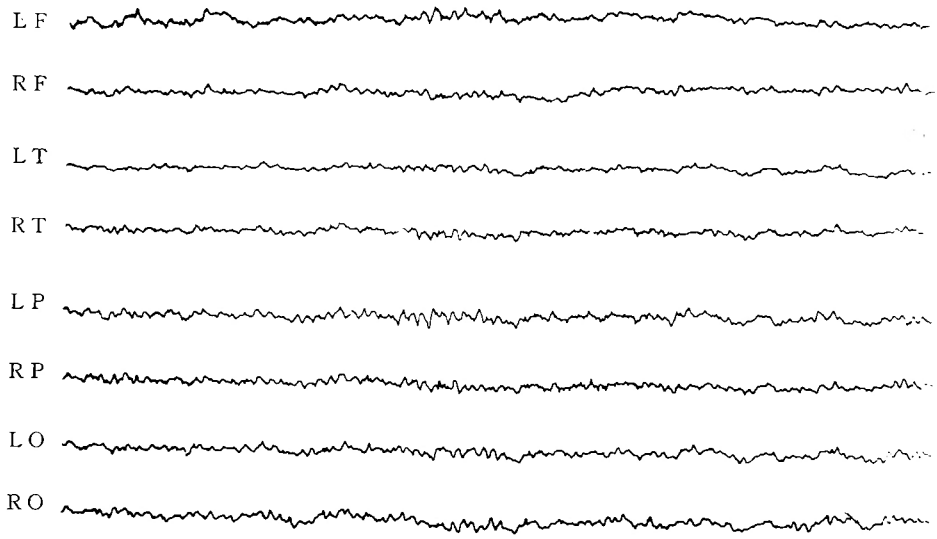

Fig. 7-a : Arousal ; Unstable background activity and slow wave component.

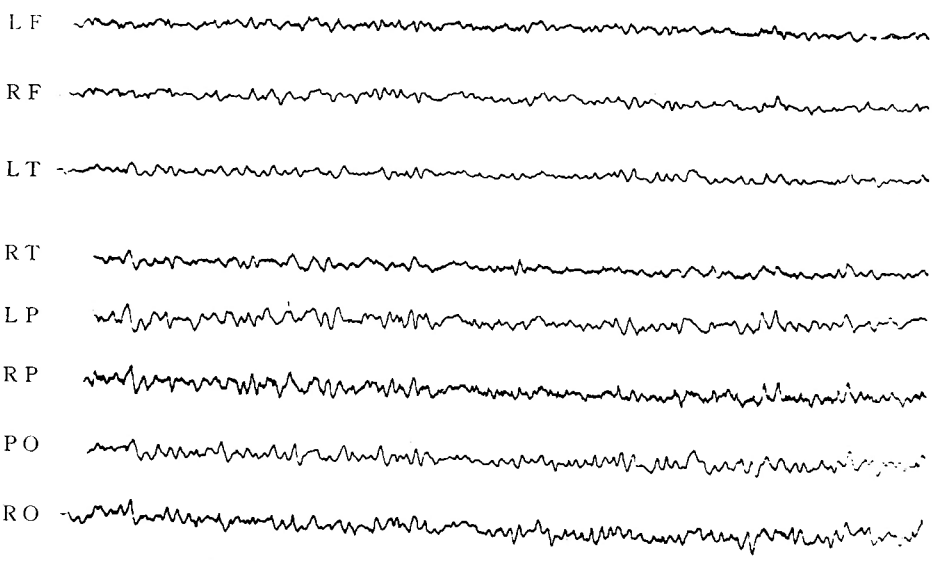

Fig. 7-b : after enforced hyperventilation ; slow components prominent

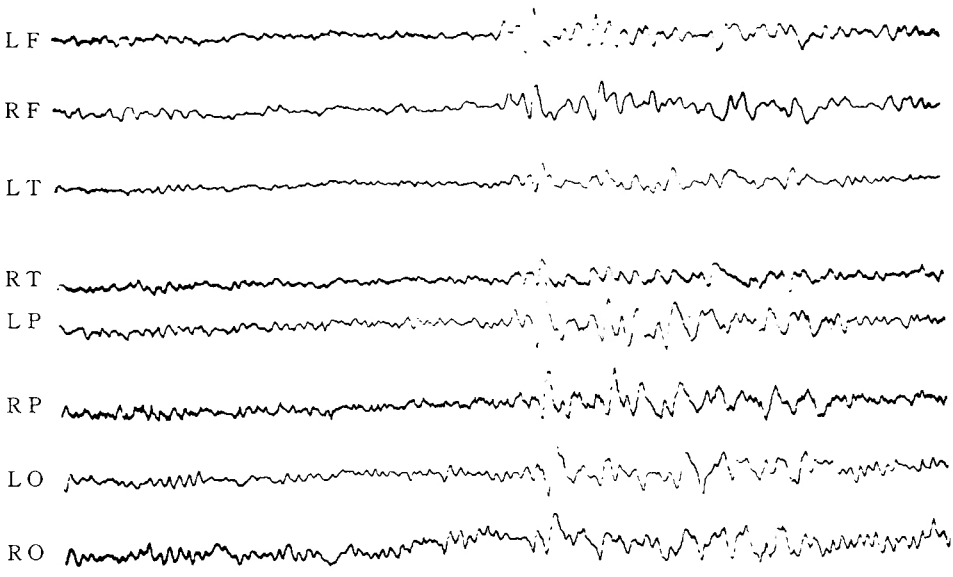

Fig. 7-c : after enforced hyperventilation ; paroxysmal slow wave

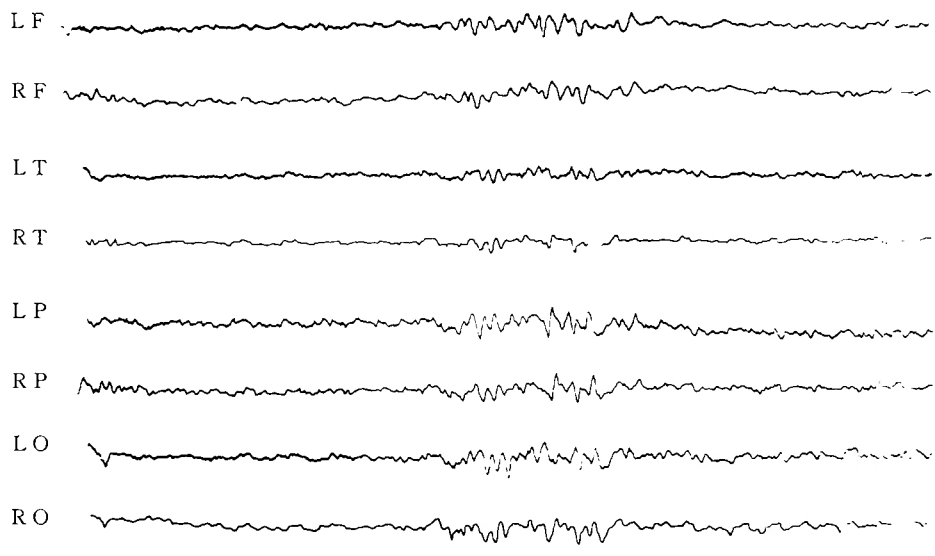

Fig. 7-d : after Diph 60 mg. injected ; paroxysmal slow wave discharge ; lowering of background activity

DISCUSSION

Abdominal neurosis is produced after laparotomy for appendicitis, cecum mobile or gastric ulcer or other diseases. Among these, the operation of appendicitis is the most common trigger of abdominal neurosis. In such cases of appendicitis, the inflammatory change of appendix is usually mild or sometimes negative. One can therefore suppose that the diagnostic failures and the operation thus performed possibly produce neurotic

complaints.

C. KIMURA called our attention to faulty spinal anesthesia as an etiological factor of this disease, because he found severe fibrotic arachnitis with adhesions and venous congestions in the laminectomy of these five cases. According to him, the inflammatory change of the arachnoid was severest in the sacral region, and it extended to the thoracic area. Trauma, bleeding by the needle or the toxic stimulus and infection by injected impure anesthetics or by instruments in spinal anesthetic process can be the cause of arachnitis. Abdominal neurosis can occur, on the other hand, following vertebral injuries by accidents or by a surgical operation as introduced in this report.

This is a fact in favour of KIMURA's opinion. The organic changes in the abdomen are too few to explain the specific symptoms of abdominal neurosis, and the greater part of them seem to consist of psychoneurotic factors.

They are suggestive of intestinal obstruction or dyskinesis, megacolon, intraabdominal adhesions, dumping syndrome, gastric or duodenal ulcer, epilepsy and other psychiatric diseases, but none of them explains the symptoms exactly. Adhesive spinal arachnitis has been pointed out by MAEKAWA, and the pathological picture was demonstrated by KIMURA in laminectomized patients. The inflammatory focus in the sacral region of the spinal cord explains well the occurrence of obstipation as well as the abdominal inflation. However, arachnitis, too, is not enough to answer the question why such complicated psychotic symptoms appear. Complications and troubles in patients lives aggravate the symptoms, while engrossment in a work can set them free from disorders.

Change of life environment, for instance, marriage, is sometimes beneficial. These facts suggest to us pathological factors in the brain, in addition to spinal arachnitis.

Considering a psychosomatic disease, the author made an electroencepharographic study of abdominal neurosis.

Idea of thalamic and hypothalamic epilepsy was established by F. A. GIBBS and E. L. GIBBS, and there are many works concerning the subject by GIBBS and GIBBS, T. M. GARNSESKI, T. R. GREEN, R. S. MORISON and E. W. DEMPSY, D. B. RINDSLEY, R. A. HAYNE and others. GIBBS et al. studied on EEG of sleep and observed that 6 % of his epileptic patients had 14 and 6 cps positive spikes. Most of the patients who had 14 and 6 cps positive spikes complained about some autonomic nervous disorders, so GIBBS pointed out these spikes as a proof of epileptic deep focus and called this disease "thalamic and hypothalamic epilepsy" electroencephalographically. Since then many discussions have been done on the relationship between the symptoms and the spikes. In Japan Y. SHIMODA, observed EEG of various autonomic nervous disorders and divided the thalamic and hypothalamic epilepsy into two groups, i. e. one as a 14 and 6 spike type and the other as a paroxysmal slow wave type. SHIMODA et al. reported the activation with intravenous injection of Diphenhydramine and the present author agrees with this. (Table 6 and 7)

GIBBS et al. illustrate that the form of this spike is brought by elimination of negative phase from 14 cps spindle wave in normal sleep, and that this appears diffuse without any relation between left and right side.

R. A. HAYNE, L. BELINSON, and F. A. GIBBS describe that "positive" originates in the disorders of the deep parts.

Diffuse and not synchronous (left and right) waves of 12 cps are shown with 6 cps spikes by the author (Fig. 1-b, 1-e, 1-f, 1-g). The author would regard these waves as ones having the same value as 14 and 6 cps positive spikes, because the ascending brainstem activating system must be taken into consideration. There is an opinion opposed to GIBBS that 14 and 6 cps positive spikes are nothing other than spindle waves in a sleeping stage. There is another report that the spike has no correlation with autonomic nervous epilepsy. Fourteen cps spikes synchronous in all leads are not always positive. The inversion of the phase is recorded independently of the leading parts (Fig. 5-a, 5-b, 5-d, 5-e). The author supposes this may be a varied form of 14 cps positive spike and is regarded as an abnormal sign in this report, but E. L. GIBBS describes that such a pattern can be detected in the normal youngster.

D. B. LINDSLEY and H. W. MAGOUN made a report on paroxysmal slow wave.

According to their experiment on acute injuries of mid-cerebrum, thalamus or cortex, the wave is recorded when cortex is free and thalamus or hypothalamus is injured. They consider this wave relates to ascending brainstem activating system. However, the slow wave is only a sign of abnormalities, because this is found in epilepsy, psychosis, tumor, mental weakness, delinquency or other cerebral disorders.

Whether paroxysmal alpha wave of high amplitude (Fig. 1-c, 1-i, 4-g, 4-j) is an alpha rhythm or the wave built up, it is important to note the prominance in amplitude. T. WADA interprets this wave suggestive of the activated neuron just under the electrode synchronous with cortical function and usually comes from epileptic disorders.

As abnormal background activity, there is a recording of low voltage, which is fast wave without rhythm, and sometimes contains slow wave of low voltage (Fig. 3-b, 6-b, 6-c, 6-d).

Continuous fast waves of a normal person are classified into M type (GOLLA, HUTTON and WALTER, 1943). In case 3 this pattern transfigurates at light sleep stage into slow wave and 14 cps spindle wave (Fig. 3-b, 3-c), but normal alpha rhythm is not seen in transfiguration time. Encephaloglaphically the patient fall from a state of being wide awake to sudden sleep. In this case such an abnormal background is always seen in preoperative time, and a stable alpha rhythm is produced after recovery by an operation (Fig. 3-b, 3-i). Abnormal background is brought by cerebral activation with peripheral continuous stimulus and a stable alpha rhythm is produced after the stimulus disappears by an operation.

This is suggestive of peripheral factor which causes abdominal neurosis.

Fourteen, or thereabout, cps spindle wave is originated in thalamus and hypothalamus or the course from them to the electrodes are disturbed (Fig. 1-a).

Slow wave components in arousal are prominent in the cases of present report (Fig. 1-b, 2-d, 3-c, 6-a, 6-b, 7-a, 7-b). This suggests that there lies slight cortical insufficiency or a disordered relation between cortex and subcortex.

Many spiky waves are seen which appear without focus and unfixed in any leads. (Fig. 1-a, 2-c, 2-e, 3-d, 4-h)

Many of them are fast alpha waves, which are suggestive of continuous activation of cortex. These waves appear also in the cerebral angiospasm, which is influenced with

thalamic and hypothalamic disorders.

The present author discussed here on abnormal waves and the waves on borderline. There is no spike and wave complex in his report. Abnormal waves discussed here are sometimes seen in normal persons, so the above discussed waves have no conclusive influence in diagnosis of abdominal neurosis. However, Table 8 shows that there are many

Table 8 Findings of abnormal EEG (No. 4)

EEG classification	13 cases of Abdominal Neurosis	14 cases of other diseases having similar complaints
Abnormal	8	3
Border line	5	7
Normal	0	4

more electroencephalographical abnormalities in abdominal neurosis than in the other diseases. Fourteen and 6 cps positive spike appear only in the former.

In the diagnosis of abdominal neurosis electroencephalography cannot play the leading role, but can be an indispensable adviser.

Abdominal neurosis is discussed here electroencephiographically ; the author wishes to call attention to the fact that poor criterion is apt to bring about abuse of "abdominal neurosis" in diagnosis.

SUMMARY

Electroencephalographical studies on thirteen cases of abdominal neurosis and 14 cases of the similar diseases are summarized as follows :

1) Many cases have electroencephalographical abnormal findings, and thirteen cases of abdominal neurosis contain abnormalities.

2) The specific waves are not discovered but 14 and 6 cps positive spike are seen in four cases.

3) Some abnormal waves disappear with the solving of their complaints and the fact suggest that elimination of afferent continuous stimuli is fruitful when the disease is sensed by them.

4) Activation with an antihistaminic (Diphenhydramine) is useful for appearance of 14 and 6 cps positive spikes and paroxysmal slow waves.

5) Electroencephalography in the diagnosis of abdominal neurosis is influential.

This research was carried out under the guidance of Prof. C. KIMURA. The author wishes to express his thanks to him. Thanks are also due Dr. TSUNEKAWA for constant advice in the investigation.

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和文抄録

腹部神経症及び類似疾患の脳波学的考察

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主に，開腹術をうけた後で発症し，いろいろの治療に頑強に抵抗する愁訴たとえば著しい腹部膨満や不定の腹痛とか排便障害などがあり，その病状形成の上に精神々経性の要素が多分に含まれているものを，腹部神経症と呼ぶ。このような症例に対して，更に開腹術をくり返すことは無効であるばかりでなく，症状を益々悪化させる。また，各種交感神経手術も一時は奏効するものの，数週間から1年以内に再発する．

本症の病態や治療法を解明せんとする努力は，長年続けられて来たにもかかわらず，まだその診断の確かな根拠さえ乏しい情況にある．そして本症はいろいろ異なる病名のもとに報告されている一方，腹部神経症という病名が乱用されている傾向もある．更に，斯る患者は多くの臨床家の下で難物として苦慮されている．

著者は，本症が中枢神経系と密接な関係を有する点に注目し，これに脳波学的検討を加えて，診断の一助とし，且つ治療方診の決定に際する示唆を得ようと試みた．

脳波記録は，いわゆる単極誘導法により，強制過呼吸や薬物賦活（Diphenhydramine, Megimide の静注など）を併せ行なつた．そして，腹部神経症13例，近似疾患14例の検査の結果，次の如き結論を得た．

1) これら双方の患者では，脳波異常を示すものが多く，特に腹部神経症では全例に異常が認められ，且つ類似疾患と較べてその程度も高かつた．

2) 腹部神経症に特有の脳波所見はなかつたが，14及び6 cps 陽性棘波を示した4例は，何れも腹部神経症の患者で，自律神経中枢の異常が暗示された．

3) 腹部神経症の異常脳波所見の中には，症状消失と共に消褪する pattern があり，本症治療には，その病状形成に関与している上行性の持続的刺激状態を取り除く事が有効であると考えられる．

4) 脳波検査に際して，抗ヒスタミン剤（Diphhnhydramine）の静注は，異常波とくに14及び6 cps 陽性棘波や発作性徐波の検出に有効であつた．

5) 脳波検査で多くの異常を発見することは，腹部神経症と診断する一つの根拠となる．